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Water ice cloud opacities and temperatures derived from the Viking IRTM data set. L. K. Tamppari[1], R. W. Zurek[1] and D. A. Paige[2], [1]Jet Propulsion Laboratory/Caltech (M/S 264-538, 4800 Oak Grove Dr., Pasadena, CA 91109, leslie.tamppari@jpl.nasa.gov), [2]University of California, Los Angeles (Dept. of Earth and Space Science, 595 Charles E. Young Dr. East, 3806 Geology Bldg., P.O. Box 951567, Los Angeles, CA 90095-1567).

The degree to which water ice clouds play a role in the **Mars climate** is unknown. Latent heating of water ice clouds is small and since most hazes appeared to be thin ($\tau \leq 1$) [1] their radiative effects have been neglected. Condensation likely limits the vertical extent of water vapor in the water column [2,3] and a lowering of the condensation altitude, as seen in the northern spring and summer [4], could increase the seasonal exchange of water between the atmosphere and the surface [1]. It has been suggested [5] that water ice cloud formation is more frequent and widespread in the aphelic hemisphere (currently the northern). This may limit water to the northern hemisphere through greater exchange with the regolith and through restricted southward transport of water vapor by the Mars Hadley circulation. In addition, it has been suggested [5] that water ice cloud formation also controls the vertical distribution of atmospheric dust in some seasons. This scavenging of dust may in turn cool the atmosphere further by removing the radiatively active dust. While aspects of this hypothesis are still being investigated and debated, the fact that clouds play a role in the climate of Mars is becoming more accepted. Whether or not clouds vary substantially on an interannual basis has been debated. Clancy et al. (1996) contrasted cloudiness during more recent cold northern spring and summers observed using ground-based microwave spectrometers with the supposedly warmer Viking period. The temperature differences found may be an artifact of the atmospheric temperatures derived from the Viking Infrared Thermal Mapper (IRTM) data set [6,7]. However, if the atmosphere becomes colder, it is not certain that the clouds would become more spatially extensive. They may form at a lower altitude or they may condense out completely, leaving little water in the atmospheric column. Thus, the question of how the cloudiness differs through time and with atmospheric temperatures is still of interest.

In order to address these questions, a combination of data and modelling can be used. Observations must continue to be made, as with the Mars Global Surveyor Thermal Emission Spectrometer and with the Mars Climate Orbiter Pressure Modulator Infrared Radiometer. In most cases it will be necessary to remove carefully the effects of non-unit surface thermal emissivities. Re-examination of previous data sets to determine clouds can extend the baseline for interannual comparisons, as was demonstrated [8] using the Viking IRTM data set. To make meaningful climate simulations, global circulation models should incorporate cloud physics and realistic Martian water ice cloud constraints. Continuing from the IRTM cloud maps [8], derived cloud opacities and cloud temperatures for several locations and seasons will be presented. Sensitivities to cloud particle sizes, surface temperature, and dust opacity will be discussed.

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